

Pending Claims (14-16, 18-19, 31-36, 39-40, 43-44, and 47-57)

U.S. Patent Application

Serial No. 09/412,512

Your Reference: US4009/4011

Our Reference: 0756-2046

As of July 15, 2002



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14. A method for manufacturing a semiconductor device comprising:  
    forming an amorphous semiconductor film through a sputtering method on  
an insulating surface; and  
    crystallizing the semiconductor film by irradiating the semiconductor film  
with a laser light wherein an oxide is formed on the semiconductor film by the irradiation  
of the laser light; and  
    removing the oxide from the crystallized semiconductor film,  
    wherein an inert gas is used as a sputtering gas in the sputtering method,  
said inert gas being at least one selected from the group consisting of Ar, He, Ne, N.

15. A method for manufacturing a semiconductor device comprising:  
    forming an amorphous semiconductor film through a sputtering method on  
an insulating surface;  
    applying a metal containing material to at least a portion of the  
semiconductor film, said metal being capable of promoting crystallization; and  
    crystallizing the semiconductor film by irradiating the semiconductor film with a  
laser light wherein an oxide is formed on the semiconductor film by the irradiation of the  
laser light; and  
    removing the oxide from the crystallized semiconductor film,  
    wherein an inert gas is used as a sputtering gas in the sputtering method, said  
inert gas being at least one selected from the group consisting of Ar, He, Ne, N.

16. A method for manufacturing a semiconductor device comprising:  
    forming an amorphous semiconductor film comprising silicon and  
germanium through a sputtering method on an insulating surface;  
    crystallizing the semiconductor film by irradiating the semiconductor film  
with a laser light wherein an oxide is formed on the semiconductor film during the  
irradiation of the laser light; and

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removing the oxide from the crystallized semiconductor film,  
wherein an inert gas is used as a sputtering gas in the sputtering method,  
said inert gas being at least one selected from the group consisting of Ar, He, Ne, N.

18. A method for manufacturing a semiconductor device comprising:
  - forming a gate wiring over a substrate;
  - forming a gate insulating film on the gate wiring;
  - forming an amorphous semiconductor film through a sputtering method on the gate insulating film;
  - crystallizing the semiconductor film by irradiating the semiconductor film with a laser light wherein an oxide is formed on the semiconductor film during the irradiation of the laser light; and
  - removing the oxide from the crystallized semiconductor film,  
wherein an inert gas is used as a sputtering gas in the sputtering method,  
said inert gas being at least one selected from the group consisting of Ar, He, Ne, N.
  
19. A method for manufacturing an electroluminescence display device comprising at least a thin film transistor, said method comprising the steps of:
  - forming an amorphous semiconductor film through a sputtering method on an insulating surface;
  - crystallizing the semiconductor film by irradiating the semiconductor film with a laser light wherein an oxide is formed on the semiconductor film;
  - removing the oxide from the crystallized semiconductor film;
  - forming a gate insulating film adjacent to the crystallized semiconductor film;
  - forming a gate electrode adjacent to the crystallized semiconductor film with the gate insulating film interposed therebetween;

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introducing an impurity into the crystallized semiconductor film to form at least a source region, and a drain region;

forming at least an interlayer insulating film over the thin film transistor;

forming a first electrode over the interlayer insulating film, said pixel electrode being electrically connected to the drain region of the thin film transistor;

forming an EL layer adjacent to the first electrode;

forming a second electrode adjacent to the EL layer,

wherein an inert gas is used as a sputtering gas in the sputtering method, said inert gas being at least one selected from the group consisting of Ar, He, Ne, N.

31. A method according to claim 14, wherein the semiconductor device is selected from the group consisting of a liquid crystal display device, an EL display device, an EC display device and an image sensor.

32. A method according to claim 14, wherein the semiconductor device is selected from the group consisting of a video camera, a digital camera, a projector, a goggle display, a navigation system for vehicles, a personal computer and a portable information terminal.

33. A method according to claim 15, wherein metal is at least one selected from a group consisting of Ni, Fe, Co, Pt, Cu and Au.

34. A method according to claim 15, wherein the metal is at least one selected from the group consisting of Ge and Pb.

35. A method according to claim 15, wherein the semiconductor device is one selected from the group consisting of a liquid crystal display device, an EL display device, an EC display device and an image sensor.

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36. A method according to claim 15, wherein the semiconductor device is selected from the group consisting of a video camera, a digital camera, a projector, a goggle display, a navigation system for vehicles, a personal computer and a portable information terminal.

39. A method according to claim 16, wherein the semiconductor device is selected from the group consisting of a liquid crystal display device, an EL display device, an EC display device and an image sensor.

40. A method according to claim 16, wherein the semiconductor device is selected from the group consisting of a video camera, a digital camera, a projector, a goggle display, a navigation system for vehicles, a personal computer and a portable information terminal.

43. A method according to claim 18, wherein the semiconductor device is selected from the group consisting of a liquid crystal display device, an EL display device, an EC display device and an image sensor.

44. A method according to claim 18, wherein the semiconductor device is selected from the group consisting of a video camera, a digital camera, a projector, a goggle display, a navigation system for vehicles, a personal computer and a portable information terminal.

47. The method according to claim 14 wherein said amorphous semiconductor film is formed over a plastic substrate.

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48. The method according to claim 14 wherein said amorphous semiconductor film is formed on a base film over a plastic substrate.

49. The method according to claim 15 wherein said amorphous semiconductor film is formed over a plastic substrate.

50. The method according to claim 16 wherein said amorphous semiconductor film is formed over a plastic substrate.

51. The method according to claim 18 wherein said amorphous semiconductor film is formed over a plastic substrate.

52. The method according to claim 19 wherein said amorphous semiconductor film is formed over a plastic substrate.

53. The method according to claim 14 wherein said laser light is irradiated with the semiconductor film exposed to the atmosphere.

54. The method according to claim 15 wherein said laser light is irradiated with the semiconductor film exposed to the atmosphere.

55. The method according to claim 16 wherein said laser light is irradiated with the semiconductor film exposed to the atmosphere.

56. The method according to claim 18 wherein said laser light is irradiated with the semiconductor film exposed to the atmosphere.

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57. The method according to claim 19 wherein said laser light is irradiated with the semiconductor film exposed to the atmosphere.